PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the application of Bedell et al. Application No. 10/602,462 Filed: 06/23/2003 For: MAGNETIC HEAD COIL SYSTEM AND DAMASCENE/REACTIVE ION ETCHING METHOD FOR MANUFACTURING THE SAME	Group Art Unit: 2652 Examiner: CHEN, Tianjie Attorney Docket No. HIT1P006/HSJ9-2003-0045US1 Date: July 31, 2006

Commissioner for Patents
P.O. Box 1450
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ATTENTION: Board of Patent Appeals and Interferences

REPLY BRIEF (37 C.F.R. § 1.193)

This Reply Brief is being filed within two (2) months of the mailing of the Examiner's Answer on May 31, 2006.

Following is an issue-by-issue reply to the Examiner's Answer.

Issue #1:

Issue # 1: Claims 25-34, 36 and 37 have been rejected under 35 USC 102(e) as being anticipated by Rose et al. (US 2001/0013991) [hereinafter "Rose"].

Group # 1: Claims 25-30, 32-34, 36 and 37

In the final office action dated 10/03/2005, claim 25 was rejected under 35 USC 102(e) as being anticipated by Rose.

In the Appeal Brief filed March 20, 2006, Applicants respectfully disagreed that Rose teaches each and every limitation of independent claim 25 and its dependent claims 26-30 and 32-34 for the reasons set forth below. Applicants also respectfully disagreed that Rose teaches each and every limitation of independent claims 36 and 37 for the reasons set forth below.

The rejection of claim 25 relies primarily on FIG. 3 of Rose to show all of the claimed features. A version of Rose's FIG. 3 from the Office Action dated Oct. 3, 2005 is reproduced below. The markings were made by the Examiner.

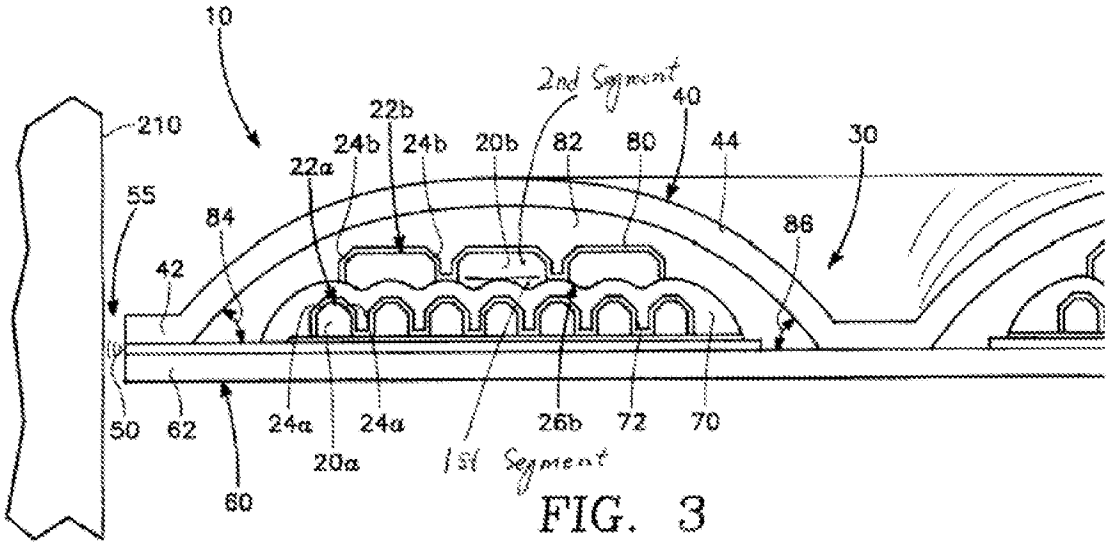


FIG. 3

Claim 25 requires a photoresist layer positioned adjacent an insulating layer for defining at least one channel, and a coil structure defined by a conductive material situated in the at least one channel. Claim 25 further requires that a profile of the channel includes a first segment defining a first angle and a second segment continuous with the first segment, the second segment defining a second angle, the second angle being different than the first angle.

To anticipate the claims, the rejection points to Rose's insulating layer 70 as meeting the claimed insulating layer, and the photoresist layer 82 as meeting the claimed photoresist layer. The rejection goes on to indicate that Rose's photoresist layer 82 defines at least one channel, and that Rose discloses a coil structure 20b defined by a conductive material situated in the channel, where a profile of the channel includes a first segment (marked on the drawing) and a second segment (marked on the drawing).

In a response to the final Office Action and in the Appeal Brief, Applicants argued that, looking to the marked-up version of Rose's FIG. 3, above, the first segment marked by the Examiner is not defined by the photoresist layer 82, but rather is defined by insulating layer 70. Thus, the first segment indicated by Rose does not anticipate the first segment of claim 25, as Rose's first segment is defined by insulating layer 70 rather than by a photoresist layer as claimed. "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The elements must be arranged as required by the claim. *In re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990). Moreover, the identical invention must be shown in as complete detail as contained in the claim. *Richardson v. Suzuki Motor Co.* 868 F.2d 1226, 1236, 9USPQ2d 1913, 1920 (Fed. Cir. 1989).

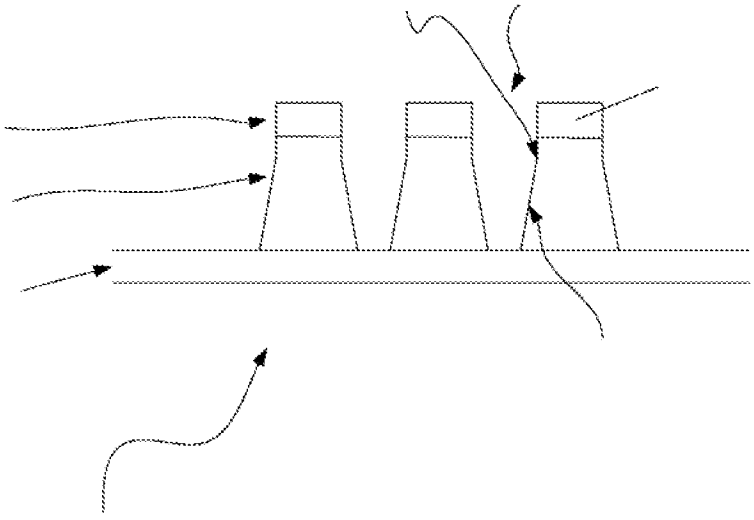
Applicants also argued in the Appeal Brief filed 03/20/2006 that the rejection of claim 25 is erroneous, as the elements of Rose are not arranged as required by the claim, in violation of the rule of *In re Bond, supra*. Again, the purported "channel" in Rose is defined by insulating layer 70 and insulating layer 80, not an insulating layer and a photoresist layer as required by claim 25. Accordingly, the rejection violates the rule of *In re Bond, supra*.

The Examiner responded in the Examiner's Answer mailed 05/31/2006 that the claim does not require that the first segment is defined by a photoresist. Applicants respectfully disagree. The second element of claim 25 requires "a photoresist layer positioned adjacent the insulating layer for defining at least one channel." Thus, the claim does indeed require that the channel be defined by the photoresist layer. It follows that because the channel is defined by the photoresist layer, segments of the channel profile must also be defined by the photoresist layer. Looking to

the relevant case law, it is clear that Rose fails to disclose all claim elements arranged as recited by the claim, as required by *In re Bond, supra*. Nor does Rose show the identical invention in as complete detail as contained in the claim, as required by *Richardson, supra*. Accordingly, the rejection is erroneous and must be withdrawn.

In the Appeal Brief filed 03/20/2006, Applicants also argued that claim 25 also requires that the segments of the channel and their respective angles are defined by the photoresist. This feature is not shown in Rose, in violation of the rule of *Verdegaal Bros, supra*. That the claimed channel segments are defined by the photoresist is implicit in the language of the claim. Further, as required by MPEP Section 2111, the Examiner must give the claims their broadest reasonable interpretation in light of the specification. Referring to the present application, the head structure described in the specification includes channels 412 defined by the photoresist layer 410. Each channel defined by the photoresist layer has multiple segments 430, 432. Note the following quote from p. 11, lines 1-6 and related Figure 4C of the present application:

> As shown, the channels **412** include multiple segments each defining different wall angles, in order to overcome the deficiencies of the prior art and improve the aspect ratios of a resultant coil structure. In particular, each channel **412** includes a first segment **430** defining a first angle and a second segment **432** defining a second angle. The first segment **430** of each channel **412** may be positioned below the corresponding second segment **432**.



The specification clearly indicates that the channel segments 430, 432 are defined by the photoresist layer. Therefore, it would not be reasonable to equate Rose's first segment defined by an insulating layer 70 with the first segment defined by the photoresist layer of the claimed invention, in light of the specification.

The embodiment of claim 25 provides an advantage over structures such as those disclosed in Rose. By defining the channel segments with the photoresist layer, a high aspect ratio can be achieved without the problems associated with milling the structure to define the coil structure, e.g., shorting.

Further, the photoresist structures having the angles claimed in claims 27-30 provide an additional benefit in that they are more stable, i.e., less prone to breaking or tipping over during processing.

The Examiner responded in the Examiner's Answer mailed 05/31/2006 that claim 25 does not require that the segments of the channel and their respective angles are defined by the photoresist. Applicants again respectfully disagree. The second element of claim 25 requires "a photoresist layer positioned adjacent the insulating layer for defining at least one channel." Thus, the claim does indeed require that the channel be defined by the photoresist layer. It follows that because the channel is defined by the photoresist layer, segments of the channel profile must also be defined by the photoresist layer. Looking to the relevant case law, it is clear that Rose fails to disclose all claim elements arranged as recited by the claim, as required by *In re Bond, supra*. Nor does Rose show the identical invention in as complete detail as contained in the claim, as required by *Richardson, supra*. Accordingly, the rejection is erroneous and must be withdrawn.

The Examiner also noted in the Examiner's Answer mailed 05/31/2006 that although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. In the instant case, Applicants believe that a fair interpretation of the claims in light of the specification would require that the claimed segments of the channel profile be defined by the photoresist. This does not require a reading in of limitations, but rather an interpretation of

the claim limitation "a photoresist layer positioned adjacent the insulating layer for defining at least one channel" that the photoresist layer defines at least one channel.

Claims 26-30 and 32-34 depend from claim 25 and therefore incorporate the limitations of claim 25, and are therefore also believed to be allowable over Rose by virtue of their dependence. Claims 36 and 37 contain limitations similar to those of claim 25, and so are believed to be allowable for the same reasons as claim 25.

Because Rose fails to disclose or inherently contain each and every limitation required by claims 25-30, 32-34, 36 and 37, and because the rejection fails to provide a basis for inclusion of inherent features in the rejection, the rejection of claims 25-30, 32-34, 36 and 37 is improper.

Group #2: Claim 31

In the final office action, the Examiner rejected claim 31 over Rose. Claim 31 depends from claim 25 and therefore incorporates the limitations of claim 25, and is therefore also believed to be allowable over Rose by virtue of its dependence.

In the Appeal Brief filed 03/20/2006, Applicants argued that the rejection of claim 31 is erroneous, as Rose fails to disclose each and every claim limitation as required by *Verdegaal Bros., supra*. In addition to the limitations of parent claim 25, claim 31 requires that the second segment of the channel is substantially vertical and defines an angle that is between 80 and 90 degrees, and the first segment defines an angle that is between 70 and 85 degrees.

Referring to FIG. 3 of Rose, relied on in the rejection, Applicants note that if the second segment identified by the Examiner is substantially vertical and defines an angle that is between 80 and 90 degrees, then the first segment identified by the Examiner cannot be between 70 and 85 degrees as required by the claims. Rather, the first segment appears to define an angle of less than 45 degrees, which is far outside the range claimed. Accordingly, Rose fails to disclose a first segment defining an angle that is between 70 and 85 degrees.

The embodiment of claim 31 provides an advantage over structures such as those disclosed in Rose. By defining the channel segments with the photoresist layer, a high aspect ratio can be achieved without the problems associated with milling the structure to define the coil structure, e.g., shorting. Further, the channel segments having the angles required by claim 31 provides an additional benefit in that they are more stable, i.e., less prone to breaking or tipping over during processing.

In the Examiner's Answer mailed 05/31/2006, the Examiner responded that an angle measured tangentially along the curved profile of Rose's structure would define an angle between 60 and 90 degrees. See the image on p. 9 of the Examiner's Answer. Applicants respectfully point out that claim 31 depends from claim 30. Thus, claim 31 requires that the second segment defines an angle that is substantially vertical and between 80 and 90 degrees; and the first segment defines an angle between 70 and 85 degrees, the second angle being different than the first angle. Under the method of calculating the angle of the first segment as presented in the Examiner's Answer, the second segment would have to be substantially horizontal to have an angle of 80-90 degrees, not substantially vertical as claimed. Thus, the rejection is erroneous and must be withdrawn.

Issue #2:

Issue # 2: Claim 35 has been rejected under 35 USC 103(a) as being unpatentable over the combination of Rose et al. with Hsiao et al. (US 6,570,739) [hereinafter "Hsiao"].

Group # 1: Claim 35

In the Appeal Brief filed 03/20/2006, Applicants argued that Rose teaches away from the high aspect ratio coils of Hsiao. Again, Rose [0042] indicates that the upper conductor 22b, the only conductor near the photoresist 82, is preferred to be larger than the lower conductor 22a. Rose [0044] goes on to indicate that the wider upper conductor 22b minimizes the combined height of the upper and lower conductors 20a and 20b. This improves yoke material deposition and improves operating frequency. Thus, Rose teaches away from high aspect ratio conductors in

order to minimize the combined height of the upper and lower conductors 20a and 20b. Accordingly, the rejection violates the rule of *In re Grasselli, supra*.

In the Examiner's Answer mailed 05/31/2006, the Examiner responded that Hsiao does not teach away from Rose's design. However, it does not matter whether Hsiao teaches away or not; if either reference teaches away, that is enough. A *prima facie* case of obviousness may also be rebutted by showing that the art, in any material respect, teaches away from the claimed invention. *In re Geisler*, 116 F.3d 1465, 1471, 43 USPQ2d 1362, 1366 (Fed. Cir. 1997). It is improper to combine references where the references teach away from their combination. *In re Grasselli*, 713 F.2d 731, 743, 218 USPQ 769, 779 (Fed. Cir. 1983).

In this case, it is Rose that clearly teaches away from modification based on Hsiao. Applicants respectfully disagree that one would be motivated to modify Rose with the teachings of Hsiao. Applicants note that paragraph [0015] of Rose indicates that steep angles of the conductors forming the windings present impediments to increasing the operating frequency of the write head. Thus, Rose suggests using wider conductors. Next, Rose teaches that the upper conductor (22b), the only conductor near the photoresist 82, is wider than the lower conductor (22a). See Rose [0042]. Further, the wider shape of the upper conductor (22b) minimizes the combined height of the upper and lower conductors, which improves operating frequency. Rose [0044]. Finally, the wider upper conductor (22b) shown in FIG. 3 lowers winding inductance and improves rise time, thereby improving operating frequency. Thus, Rose indicates that the wider upper conductor is critical to Rose's design. Modification based on Hsiao, as proposed in the rejection, would require increasing the vertical thickness of Rose's upper conductor (22b) by 3.2X minimum, and potentially up to 16X. Thus, the resulting writer would have a very high coil structure, and further, would have very steep sides. However, these are precisely the features Rose is attempting to avoid, as noted in Rose [0015] and [0044].

From the foregoing, it is clear that Rose teaches away from the modification proposed in the rejection, namely increasing the height of Rose's upper conductor (the only conductor relevant to the rejection) by up to 16X. Applying the rule of *In re Geisler, supra*, because Rose teaches away from such a modification, the rejection is improper.

In the Appeal Brief filed 03/20/2006, Applicants also argued that the rejection of claim 35 fails the first prong of the *Graham* test, namely that there is insufficient suggestion or motivation to combine the prior art references and modify Rose based on Hsiao as suggested in the rejection. The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). Although a prior art device "may be capable of being modified to run the way the apparatus is claimed, there must be a suggestion or motivation in the reference to do so." 916 F.2d at 682, 16 USPQ2d at 1432. In the instant case, Rose indicates that conductor 22b, the only conductor near the photoresist 82, is preferred to be larger than the lower conductor 22a. *See* Rose [0042]. Further, Rose's wider upper conductor lowers winding inductance and improves rise time, thereby improving operating frequency. *See* Rose paragraph [0045]. Accordingly, the addition of Hsiao's high aspect ratio coils would provide no additional benefit. Further, the motivation for adding Hsiao's high aspect ratio coils as cited by the Examiner is already provided by the upper conductor 22b as stated in Rose [0045], and so there is no motivation to replace Rose's upper conductor 22b with Hsiao's coils.

In the Examiner's Answer mailed 05/31/2006, the Examiner responded that both Rose and Hsiao suggest ways of improving rise time, and so one skilled in the art would be motivated by the teachings of both references for further improving rise time. Applicants respectfully disagree that one would be motivated to modify Rose with the teachings of Hsiao. Rose's upper conductor is designed with a low profile to improve rise time. There is no fact presented in the rejection or the Examiner's answer that indicates that modifying Rose's structure based on Hsiao would further improve Rose's rise time. Such a modification might in fact decrease the rise time of Rose's structure. Therefore, absent any showing that the proposed modification to Rose based on Hsiao would actually improve Rose's rise time, it is Applicants' position that the rejection fails to show sufficient motivation to make the proposed modification. Therefore, the rejection fails the *Graham* test.

Applicants also reiterate that Rose indicates that the wider upper conductor is critical to Rose's design. Modification based on Hsiao, as proposed in the rejection, would require increasing the

vertical thickness of Rose's upper conductor (22b) by up to 16X. Thus, the resulting writer would have a very high coil structure. However, this is precisely what Rose is attempting to avoid, as noted in Rose [0015]. Therefore, there is no motivation to combine the teachings.

In view of the remarks set forth hereinabove, all of the independent claims are deemed allowable, along with any claims depending therefrom.

In the event a telephone conversation would expedite the prosecution of this application, the Examiner may reach the undersigned at (408) 971-2573. For payment of any additional fees due in connection with the filing of this paper, the Commissioner is authorized to charge such fees to Deposit Account No. 50-2587 (Order No. HSJ9-2003-0045US1).

Respectfully submitted,

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